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DEVICE FOR THE SELECTION OF OPERATING MODES

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Background Information

German Patent Application No. 43 32 411 describes a theft protection system for motor vehicles having a plurality of controllers for vehicle components. Different controllers can be enabled when a piece of input test information agrees with a piece of predefined reference information. The test information differs from the reference information for at least two controllers. The fingerprint of an authorized user is provided as test and reference information. A controller is enabled if its test information agrees with the reference information and an additional acknowledge signal of at least one additional controller is present in a valid manner. This enhances security against manipulation. These controllers, however, are only enabled under certain conditions. Additional different modes of operation are not provided.

Summary Of The Invention

The device according to the present invention for selecting operating modes has a biometry data detector which detects biometry data of a user as an identification signal. At least one reference pattern is stored in a biometry profile memory. In the device according to the present invention, an operating mode selector is provided which activates one of at least two operating modes provided as a function of the agreement between the biometry signal and the reference pattern. The biometry data detector already present in connection with an authorization query for operating a vehicle is used for additional functions such as the selection of additional operating modes. Therefore, additional control elements are not needed for this purpose. In addition, the comparison of the biometry signal with the reference pattern ensures that

operating modes having high security requirements can also in fact only be activated by a user identified through the biometry data. Authorization can be unambiguously assigned to authorized individuals for performing certain operating modes. For example, only the vehicle owner may initiate a training procedure for additional users if the biometry data of the vehicle owner are available. Thus the device according to the present invention increases security against manipulation attempts by unauthorized individuals.

In one expedient refinement, user queries which are answered depending on the agreement of the biometry signal and the reference pattern are provided in one operating mode. The biometry data detector present is used as a user input option for the appropriate menu-based queries. A first input sequence could be preassigned in this context to the input answer "yes" and a second input sequence of the biometry signal could be preassigned to "no." Thanks to the comparison operation between the biometry signal and the reference pattern, the user inputs can be checked for validity at the same time.

In an expedient refinement, activation of one of the at least two operating modes provided and/or a response to the user query depends on the reference pattern with which the biometry signal agrees. For example, if the fingerprint is used as the biometry signal, different operating modes can be assigned to the reference patterns belonging to the different fingers. For example, if the first finger is placed on the biometry data detector, this signals to the device the user's wish to activate the first operating mode; the second finger signals the activation of the second operating mode, and so forth.

One embodiment provides activation of one of the at least two

operating modes and/or a response to a user query depending on how often the biometry signal agrees with a reference pattern. Thus only one reference pattern must be stored in the biometry profile memory for each user, yet a decision can be made concerning the desired operating mode based on the number of detected biometry signals during a certain time period. One touch is recognized by the device as a desire to activate the first operating mode; two touches calls for the activation of the second operating mode, and so forth.

In one expedient embodiment, the desired operating mode is selected by using the duration of the agreement of the biometry signal and the reference pattern as the expression of the desired operating mode. Thus, for example, the user's finger briefly touching the biometry data detector signals the execution of a normal operating mode, for example, a driving authorization query, while the finger dwelling on the biometry data detector for a longer period is interpreted by the device as the desire to switch to a second operating mode, for example, the training mode. Only one reference pattern must be stored in the biometry profile memory for each user.

In another embodiment, activation of one of the at least two operating modes provided and/or a response to the user query depends on the sequence of the response in which the biometry signal agrees with the reference patterns. The inclusion of a certain order of finger touches provides a greater degree of freedom concerning the number of operating modes and user inputs that can be selected.

Brief Description Of The Drawings

Figure 1 shows a block diagram.

Figure 2 shows a first flow chart of the device according to the present invention.

Figure 3 shows a second flow chart of the device according to the present invention.

Detailed Description

A biometry data detector 10 issues a biometry signal 11 to an operating mode selector 14. A first reference pattern Ref1, a second reference pattern Ref2, a third reference pattern Ref3, and a fourth reference pattern Ref4 are stored in a biometry profile memory 12. Operating mode selector 14 exchanges data with biometry profile memory 12 and an operating mode computer 16, in which a first operating mode BA1, a second operating mode BA2, a third operating mode BA3 and a fourth operating mode BA4 are stored. Operating mode computer 16 exchanges data with a controller 20 via a bus system 18.

User-specific features are regarded as biometry data detected by biometry data detector 10. Biometric features such as fingerprint, eye status, iris, retina, or speech recognition -- to name just a few -- uniquely identify a valid user and are stored in digitized form as reference patterns Ref1 through Ref4 in biometry profile memory 12. Hereinafter it will be assumed that fingerprint testing is used as the biometric identification procedure. In this context, a scanner may be used, for example, as biometry data detector 10.

In a first embodiment, four fingerprints of different fingers of the authorized user are stored as reference patterns Ref1 through Ref4. Operating mode selection starts according to Figure 2 by a button being pressed by the user, for example, or by activating biometry data detector 10 by entering the

vehicle, step 101. The user is then prompted to place a finger on biometry data detector 10 in order to thus generate a first biometry signal 11. The input procedure of first biometry signal 11 is activated for a certain period of time, step 102. In the following query (step 103), it is checked whether first biometry signal 11 agrees with one of the four reference patterns Ref1 through Ref4. If this is not the case, this indicates a non-authorized user and the operating mode selection process is interrupted, step 104. Otherwise reference pattern Ref1, corresponding to first biometry signal 11, is buffered. If the user wishes to activate one of operating modes BA2 through BA4, he is prompted to place another finger on biometry data detector 10, so that it can input second biometry signal 11, step 105. At the same time, a time window is started and is evaluated in the following query 106. If the user does not touch biometry data detector 10 within a predefined time period, i.e., no second biometry signal 11 is present within this time period, operating mode selector 14 activates first operating mode BA1, step 107.

First operating mode BA1 represents normal operation. It gives the user, who has already identified himself in query 103 as an authorized user, free use of the vehicle, step 107. For this purpose, enable information may be sent to a controller 20 that is required for operation. Otherwise, the second biometry signal is also checked for validity in query 108 by comparison with reference patterns Ref1 through Ref4. If second biometry signal 11 is different from all reference patterns Ref1 through Ref4, operating mode selection is aborted, step 109. In the case of a second biometry signal 11 recognized as valid, this second biometry signal 11 is buffered and the system will wait for a third input procedure. The user is now prompted for the third time to place one of

his fingers on the biometry data detector to select an operating mode. Thus third biometry signal 11 is input, step 110. As in query 108, third biometry signal 11 is compared to reference patterns Ref1 through Ref4 to determine agreement. If no agreement is found, the operating mode selection is aborted, step 109. Otherwise, the selection procedure follows, step 112. Depending on first, second, and third biometry signal 11 detected and their order, one of the remaining operating modes BA2 through BA4 is activated.

For example, the user enters second operating mode BA2 if he sequentially places his first finger (corresponding to first reference pattern Ref1), his second finger (corresponding to second reference pattern Ref2) and his third finger (corresponding to third reference pattern Ref3). In this case, first biometry signal 11 agrees with first reference pattern Ref1, second biometry signal 11 agrees with second reference pattern Ref2, and third biometry signal 11 agrees with third reference pattern Ref3. In this configuration, second operating mode BA2 is selected.

Third operating mode BA3 is activated, for example, if the second finger is placed on biometry data detector 10 first, then the fourth finger, and then the first finger. In this case, first biometry signal 11 agrees with second reference pattern Ref2, second biometry signal 11 agrees with fourth reference pattern Ref4, and third biometry signal 11 agrees with first reference pattern Ref1. If the appropriate conditions are met, operating mode selector 14 activates third operating mode BA3.

Fourth operating mode BA4 is assigned in a similar manner; the necessary condition here is a unique correspondence between

the finger sequence and the respective operating mode. A plurality of OR gated finger sequences may also be allowed for the selection of a single operating mode. This is particularly convenient when the activation of operating modes BA1 through BA4 is to be enabled for additional users. If no allowed finger sequence is present for activating an operating mode BA2 through BA4, the process is aborted, step 109.

Figure 3 shows, by way of example, the input procedure for second operating mode BA2, the user, prompted by a menu, being able to select an operating mode using biometry data detector 10. If the user, according to Figure 2, has reached step 113, a corresponding subprogram implementing second operating mode BA2 is called up and started, step 121. In second operating mode BA2, for example, the user can train other users as normal users or as users having the same rights as himself. During a step 122, a display, already present in the vehicle, is activated so that it displays the string "Train as master user?". For this purpose, authorization checks, which are not described here in detail, may be required. The user's attention is also called to the fact that placing his first finger on biometry data detector 10 signals "yes" and placing his second finger signals "no." The user is thus prompted to make the appropriate selection, step 123.

In subsequent query 124, biometry signal 11 delivered by biometry data detector 10 is compared to first reference pattern Ref1 (corresponding to the first finger) in order to determine whether the user has answered "yes" to the question posed in step 123. If biometry signal 11 agrees with first reference pattern Ref1, step 125 follows. In this step 125, the user to be trained as the master user is prompted to place four fingers one after the other, for example, on biometry

data detector 10. Biometry signal 11 thus obtained is stored for each finger in biometry profile memory 12 as additional reference patterns Ref5 through Ref8. In order to grant this master user unrestricted access also to the three additional operating modes BA2 through BA4, second operating mode BA2 being also activated when fifth reference pattern Ref5 is present as first biometry signal 11, sixth reference pattern Ref6 being present as second biometry signal 11, and seventh reference pattern Ref7 being present as third biometry signal, in this order, become the OR gated conditions set in step 112 for activating the respective operating modes BA2 through BA4. This version can also be used for activating additional operating modes BA3 and BA4 in a similar manner.

If the user does not wish the new user to be trained as the master user -- i.e., biometry signal 11 does not agree with first reference pattern Ref1, an additional query 126 may follow. In this query, biometry signal 11 is compared to second reference pattern Ref2, which stands for the answer "no." If there is no agreement, the training procedure is aborted, step 127. Otherwise step 128 may follow, in which the user to be trained as a normal user is prompted to let his fingerprint be scanned by biometry data detector 10 and stored in biometry profile memory 12. In contrast with step 125, the additional OR gating for the selection of additional operating modes BA2 through BA4 is omitted. The training process is thus completed, step 129. The normal user is only authorized to switch to first operating mode BA1, which provides normal operation of the vehicle. Query 103 should be modified so that authority is also recognized when biometry signal 11 agrees with one of reference patterns Ref1 through Ref7.

Third operating mode BA3 can be designed as a repair workshop

mode in which known fingerprints of the workshop personnel are valid for a certain period of time. As an alternative, no identification via biometry data detector 10 is needed for using the vehicle while it is in the repair workshop. In this operating mode, controller 20 is enabled independently of the agreement of biometry signal 11 with one of reference patterns Ref1 through Ref4.

Fourth operating mode BA4 is a hotel operating mode, in which a fingerprint of the hotel employee is learned and deleted upon leaving the hotel. With this authorization the hotel employee can only use the resources of the vehicle with certain restrictions, for example, only in first gear and reverse. Controller 20 ensures the restriction of resources. As an alternative, additional operating modes can be provided, such as a service mode, for example. In this mode, the system can be told to make accessible or block certain pieces of equipment in the vehicle such as the trunk, the engine compartment, the mobile telephone, or the navigation system for certain individuals. This operating mode is suitable for rental vehicles where certain pieces of equipment can be enabled depending on the renter's wishes.

Further alternatives and advantageous embodiments are possible without going beyond the scope of the present invention. In addition to the above-described predefined sequence of the fingerprints to be entered, operating modes BA1 through BA4 can also be selected on the basis of the frequency of finger touches. One-off detection of a fingerprint shows the user's intention to select first operating mode BA1; two touches show the intention to activate second operating mode BA2, three touches show the intention to activate third operating mode BA3, and so forth.

As an alternative, a touch with the finger may start a timer, which detects the selection of the desired operating mode based on the duration of the touch. For example, a brief touch may signal normal operation BA1, while dwelling on biometry detector 10 for a longer period of time initiates second operating mode BA2.

Abstract Of The Disclosure

A device for selecting operating modes has a biometry data detector which detects biometry data of a user as a biometry signal. At least one reference pattern is stored in a biometry profile memory. An operating mode selector is provided which activates one of at least two operating modes provided as a function of the agreement between the biometry signal and the reference pattern.

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